FREQUENCY COMB REFERENCED SPECTRA OF $A - X$ TRANSITIONS IN SH

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Recent observations of a possible SH absorption feature in the atmosphere of a hot Jupiter exoplanet have sparked a renewed interest in the molecule's electronic spectroscopy, motivating the creation of a new line list.[a] This list currently relies on absolute transition frequencies measured nearly 70 years ago with a grating spectrograph.[b] While the 0.03 cm^{-1} accuracy achieved in these experiments was impressive for the time, measurements using modern laser spectroscopy techniques can do much better. In this talk, I will present our measurements of the $A\,^2\Sigma^+, v' = 0 \leftarrow X\,^2\Pi_{3/2}, v'' = 0, J'' = 3/2$ transitions in SH using a continuous-wave ultraviolet laser stabilized to an optical frequency comb. The same apparatus was previously used to measure $A - X$ transitions in OH[c]. Due to the broader linewidths and lower fluorescence detection efficiency caused by a short A state predissociation lifetime, the SH transition frequencies could not be determined as precisely as those in OH. We were nevertheless able to determine the frequencies of 12 transitions from the rotational ground state with an absolute uncertainty of less than 1.2 MHz (4×10^{-5} cm^{-1}).

[a] Gorman et al., *Mon. Not. R. Astron. Soc.* 490, 1652 (2019)

[b] Ramsay, *J. Chem. Phys.* 20, 1920 (1952)

[c] Fast et al. *Phys. Rev. A* 98, 052511 (2018)